

## ABSTRACT

A control device (30) receives a power supply current ( $I_b$ ) from a current sensor (11) and a reactor current ( $I_L$ ) from a current sensor (18) and detects a maximum value ( $I_{Lmax}$ ) and a minimum value ( $I_{Lmin}$ ) from the reactor current ( $I_L$ ) and from the detected maximum and minimum values ( $I_{Lmax}$  and  $I_{Lmin}$ ) and the power supply current ( $I_b$ ) determines whether the reactor current ( $I_L$ ) traverses the zero point, and if so the control device (30) generates and outputs a signal (PWMS) to an up converter (12) which responds to the signal (PWMS) by stopping switching to perform an up or down converting operation.